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Analysis of Technical Issues Relating to California's Request for Waiver of Federal Preemption with Respect to Exhaust Emission Standards and Test Procedures for 1980 Models

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Technical Report

Analysis of Technical Issues Relating to:

California's Request for Waiver of Federal Preemption with Respect to Optional 100,000-Mile Exhaust Emission Standards and Test Procedures for 1980 and Subsequent Model Year Light-Duty Vehicles and 1981 and Subsequent Model Year Light-Duty Trucks and Medium-Duty Vehicles

by

Richard A. Rykowski

December 5, 1979

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16. ABSTRACT

California has asked EPA for a waiver of Federal preemption concerning a number of changes to emission standards and test procedures applicable when a vehicle is certified for 100,000 miles. A separate set of emission standards are applicable when a vehicle is being certified for 50,000 miles, which is the Federal certification period. These 50,000 mile emission standards have already been granted a waiver by EPA under the requirements of the Clean Air Act and are not being revised. The changes to the 100,000 mile emission standards and test procedures constitute changes to an option and are not required to be met by all manufacturers. Th The 100,000 mile certification revisions are to take effect beginning with the 1980 model year for passenger cars and with the 1981 model year for light duty trucks and medium duty vehicles. This document shall concern itself itself with two criteria(1) that the state was not arbitrary and capricious in determining that the state standards will be at least as protection of public health and welfare as applicable Federal standards and (2) that the state standards and accompanying test procedures are consistant.

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Introduction

California has asked EPA for a waiver of Federal preemption concerning a number of changes to emission standards and test procedures applicable when a vehicle is certified for 100,000 miles. A separate set of emission standards are applicable when a vehicle is being certified for 50,000 miles, which is the Federal certification period. These 50,000 mile emission standards have already been granted a waiver by EPA under the requirements of Section 209(b) of the Clean Air Act and are not being revised. Thus, it is helpful to note that the changes to the 100,000-mile emission standards and test procedures constitute changes to an option and are not required to be met by all manufacturers. The 100,000 mile certification revisions are to take effect beginning with the 1980 model year for passenger cars and with the 1981 model year for light-duty trucks and medium-duty vehicles.

The criteria under which a waiver of Federal preemption can and must be granted is stated in Section 209 (b) of the Clean Air Act as amended in 1977:

> (b)(1) "The Administrator shall, after notice and opportunity for public hearing, waive application of this section to any State which has adopted standards (other than crankcase emission standards) for the control of emissions from new motor vehicles or new motor vehicle engines prior to March 30, 1966, if the State determines that the State standards will be, in aggregate, at least as protective of public health and welfare as applicable Federal standards. No such waiver shall be granted if the Administrator finds that-
>
> (A) the determination of the State is arbitrary and capricious,
>
> (B) such State does not need such State standards to meet compelling and extraordinary conditions, or
>
> (C) such State standard and accompanying enforcement procedures are not consistent with section 202(a) of this part."

This document shall concern itself with only two of the criteria mentioned in Section 209(b); 1) that the State was not arbitrary and capricious in determining that the State standards will be, in the aggregate, at least as protection of public health and welfare as applicable Federal standards and 2) that the State standards and accompanying test procedures are consistant with Section 202(a) of the Clean Air Act. For the purposes of this document, consistency with Section 202(a) will be interpretted as meaning technological feasibility given the available leadtime and with consideration given to the cost of compliance (see paragraph 202(a)(2) of the Clean Air Act). The fact that compelling and extraordinary conditions existing in California has been determined in past waiver decisions and will not be discussed here.

Revisions Proposed by California

California's current emission standards and the maintenance items allowed for vehicles certified for 100,000 miles are shown in Table 1. California's proposed revisions are shown in Table 2. In these revisions, California has 1) numerically raised the hydrocarbon (HC) and carbon monoxide standards applicable under 100,000-mile certification (Options 1 and 2), 2) given an HC exhaust emission allowance for vehicles with very low and durable evaporative HC emissions which are certified for 100,000 miles, 3) allowed the durability vehicles used to determine compliance with these standards to 'line cross' as long as these vehicles did not line cross both applicable California or Federal 50,000-mile standards, and 4) increased the amount of maintenance allowed under the 100,000-mile option.

Discussion

As mentioned earlier, EPA must decide, 1) that all of these proposed revisions are technologically feasible given available leadtime and cost and 2) that California was not arbitrary and capricious in determining that their standards with these revisions are equally protective of public health and welfare as applicable Federal standards. The appropriate decision in each of these two areas will be made below.

It is rather simple to show that these revisions are technologically feasible given the leadtime available and the cost of compliance. It can be done in two ways. One, each separate change shown in Table 2 is a relaxation of the requirements listed in Table 1. If the current 100,000-mile option (Table 1) was determined to be technologically feasible, etc., then the revised 100,000-mile options must also be technologically feasible, etc. This assumes that no new information has come to light since the decision was made on the current 100,000-mile option that would alter that previous decision, which is the case here.

Two, California has shown that at least one vehicle has certified under the existing 100,000-mile option.1/* Given that the revised options are less stringent, this same vehicle could have certified with the revisions in place. This also demonstrates that the revisions are technologically feasible, etc. As mentioned before, the 100,000-mile standards are optional and do not have to be met by everyone.

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* California stated at the Hearing that this vehicle certified under the revised Option 2 standards. However, an examination of the data made available shows this vehicle to be meeting the existing 100,000-mile standards also.

Table 1

Emission Standards and Allowable Maintenance
Under California's Current 100,000-Mile Option

Hydrocarbon and Carbon Monoxide Standards - Same as applicable 50,000-mile standard except must be met for 100,000 miles.

Oxides of Nitrogen Standards - Numerically 15-150 percent higher than applicable 50,000-mile standard depending on vehicle class and model year and must be met for 100,000 miles.

Allowable Maintenance (Minimum Interval)

Accessory drive belt adjustment (30,000 miles)

Air filter (30,000 miles)

Fuel filter replacement (30,000 miles)

Idle speed adjustment (30,000 miles)

Valve lash (15,000 miles)

Table 2

Emission Standards and Allowable Maintenance Under California's Proposed Revised 100,000-Mile Option

Oxides of Nitrogen Standards - Same as under current 100,000-mile option.

Hydrocarbon and Carbon Monoxide Standards -

Option 1 - Same as applicable 50,000-mile standard and must be met for only 50,000 miles. Least-squares line used to determine deterioration factor is fit to data over full 100,000 miles.*

Option 2 - Numerically 21.7 percent greater than applicable 50,000-mile standards and must be met for 100,000 miles.*

Evaporative Hydrocarbon Allowance (available under both options) - For vehicles with durable evaporative emission control systems showing emissions of less than 1.0 gram per test, the applicable hydrocarbon emission standard shall be modified as follows:

$$HC_{ex} = .75\ (.185 - \frac{Di + 3.3\ HS}{29.4}\ ) + HC_{O}$$

Where:

HC_{ex} = adjusted exhaust hydrocarbon standard

HC_{O} = unadjusted exhaust hydrocarbon standard

Di = diurnal evaporative emissions
Hs = hot soak evaporative emissions

Allowable Maintenance (Minimum Intervals)

Accessory Drive Belt Adjustment (30,000 mi)
Valve Lash Adjustment (15,000 mi)
Spark Plug Replacement (30,000 mi)
Air Filter Replacement (30,000 mi)
Exhaust Gas Sensor Replacement** (30,000 mi)
Choke Cleaning or Lubrication** (30,000 mi)
Break-in Maintenance (5,000 mi)
Fuel Filter Replacement (30,000 mi)
Idle Speed Adjustment (30,000 mi)
Injection Timing Adjustment (30,000 mi)

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* Deterioration factors obtained from vehicles of the same engine family which exceed these standards may be used as long as these vehicles meet California or Federal standards applicable for 50,000-mile certification.

** Allowed under Option 1 standards only.

A point concerning these options was raised by Chrysler at the EPA Hearing on the granting of this waiver. It is more legal than technical and as such will not be resolved is this report. However, for completeness it deserves mention. The point made was that regardless of the feasibility of the 100,000-mile options, a manufacturer like Chrysler did not have the resources to evaluate all the options and take the most advantageous option. They are forced to decide early which option they will certify under without being able to give the other options the same level of consideration as manufacturers like General Motors and Ford. In essence, they are saying that the more options made available, the easier it is for larger manufacturers to certify, but more options did not always help the smaller manufacturers. The resolution of this comment will be left to others examining the legal aspects of granting this waiver and this analysis will move on to the second criteria, equal protectiveness.

The second decision which needs to be made is whether or not California was arbitrary and capricious in their decision that their standards as revised are still equally protective as Federal standards. To make this decision, it will be helpful to examine the individual changes between Table 1 and 2 separately. Some of these modifications can be easily shown to be equally protective, while others are more complicated.

The modifications for which it is a rather simple task to show them to be equally protective as Federal standards are the two test procedure areas, allowable maintenance and line crossing, and the Option 1 HC and CO standards. As can be seen, the allowable maintenance shown in Table 2 is increased from that of Table 1. However, if the allowable maintenance shown in Table 2 is compared to that allowed under Federal regulations, 2/ one finds that all except one item of the Table 2 maintenance is allowed under Federal regulations at least as often. The exception is maintenance of the exhaust gas sensor every 30,000 miles under Option 1. Maintenance of the exhaust gas sensor is not specifically addressed in the Federal provisions. However, the Administrator has been allowing maintenance of these sensors every 15,000 miles under the provisions contained in 40 CFR 86.079-25(a)(5), which govern the allowance of maintenance in addition to that actually specified.3/ Thus, in this area of maintenance as well as the others, the Calfornia revision is still more stringent than applicable Federal regulations and should not cause California standards to be less stringent than Federal standards.

The other modification to the test procedures is the allowance of line crossing with durability data vehicles used when certifying for 100,000-miles. These vehicles are still required to meet either the California or Federal standards applicable at 50,000 miles at every test point. Also, the least-squares line fitted to this data must fall below the applicable 50,000-mile California or

Federal standards. In essence, the 100,000-mile durability vehicles must meet the same line-crossing requirements that 50,000-mile durability vehicles must meet, but no more. California's reasoning is that this allows Federal and California 50,000-mile durability data to be extended for use in 100,000-mile certification and saves manufacturers the cost of a second durability vehicle. This is similar to California's allowance of the use of Federal 50,000-mile durability data for California 50,000-mile certification even if the applicable Federal standards are well above the California standards.

In this case, it is simplest to demonstrate that the revision is equally protective by comparing it to other California actions which have already been declared equally protective by EPA. EPA has already granted California essentially the same waiver for its 50,000-mile standards in that California's 50,000-mile durability vehicles do not have to meet (i.e., can line-cross) California's 50,000-mile standards if they meet (and do not line-cross) Federal 50,000-mile standards. The revision to the line-crossing provision for the 100,000-mile standards is simply an extension of the previously-waived philosophy one more step. California's 100,000-mile durability vehicles do not have to meet (i.e., can line-cross) the 100,000-mile standard as long as they meet (and do not line-cross) either California or Federal 50,000-mile standards. The extention by California of this allowance to 100,000-mile durability vehicles should be no different than the first extention to 50,000-mile durability vehicles and should be treated no differently. Thus, the revision of the 100,000-mile line-crossing provision, like the allowable maintenance revision, will not cause California standards to be less stringent than Federal standards and, for its part, is then judged to be equally protective of public health and welfare.

The determination that the last changes, the evaporative HC emission allowance, the Option 1 standards and the Option 2 standards, are equally protective as Federal standards are more difficult in that one can contrive circumstances where these revisisions cause California standards to be less stringent than Federal standards and other circumstances where the opposite is true. In the case of these revisions more so than the previous two, it will be important to remember that EPA can only determine whether or not California was arbitrary and capricious in their determination that their revised standards are equally protective of public health and welfare. The granting of the waiver of Federal preemption does not and cannot depend on EPA's judgement of whether or not the revised California standards are equally protective. If EPA can show conslusively that the revised California standards are less stringent, then of course California's determination must be erroneous or arbitrary. If the revisions have conflicting effects, however, increasing stringency here and reducing it there, then it is possible for EPA and California to

differ on the relative importance of the two effects and a waiver still be granted. California must simply have good reason why they take their particular stance.

The Option 1 standards will be examined first. Here, California will be shown not to be arbitrary and capricious by comparing these standards to the existing California 50,000-mile standards which have already been waived by EPA. The differences between the Option 1 standards and the California 50,000-mile standards are as follows. First, both sets of HC and CO standards are numerically the same and determined at 50,000 miles. However, the deterioration factor under Option 1 is taken from a least-squares line fit to 100,000 miles of emission data as opposed to 50,000 miles for the 50,000-mile standards. Under Option 1, the vehicle is also warranted to meet these standards for 100,000 miles as opposed to 50,000 miles. Both of these differences cause the Option 1 HC and CO standards to be more stringent than California's existing 50,000-mile standards. An exception to this could occur if the deterioration in emissions was lower after 50,000 miles than before, causing the 50,000-mile deterioration factor to be less under Option 1 than under the existing 50,000-mile standards. This situation is not likely to occur, however, and few manufacturers would argue that it was easier to meet the Option 1 HC and CO standards than to meet California's 50,000-mile HC and CO standards. Thus, with respect to emissions of these two pollutants, the Option 1 standards are more stringent than the existing California 50,000-mile standards.

The situation with respect to NOx emissions is not as clear cut. Option 1 extends compliance with the NOx standard to 100,000 miles, but also numerically increases the NOx standard by substantial amounts. The first difference increases the stringency of the NOx standard. However, the effect of the second difference is unclear. A vehicle with a very high deterioration of NOx emissions after 50,000 miles may find it more difficult to meet the Option 1 standard. A vehicle with more typical NOx emission deterioration after 50,000 miles (like that of the first 50,000 miles) would find it much easier to meet the Option 1 NOx standard. Thus, while the Option 1 HC and CO standards are clearly more stringent than the California 50,000-mile standards, the Option 1 NOx standard is both more and less stringent than the 50,000-mile NOx standard.

In their supporting analyses,4/ California recognizes the above tradeoff. Indeed, tradeoffs such as these have been made by California before and waived by EPA. For example, California's 50,000-mile CO standard for 1980 model year passenger cars is less stringent than the Federal standard, but California's 50,000-mile NOx standard is more stringent. A tradeoff was made between CO and NOx control. Here, California is accepting a possible increase in NOx emissions (due to the numerically higher standard) for better HC and CO control (100,000-mile durability) and possible reductions

in NOx emissions (100,000-mile durability), especially from three-way catalyst-equipped vehicles. As there are factors both increasing and decreasing the stringency of the Option 1 standard over the 50,000-mile standards, no conclusive determination can be made one way or the other. Without a conclusive determination that Option 1 is less stringent than California's 50,000-mile standards (and Federal standards), it is not possible to demonstrate that California is being arbitrary and capricious in this case. Thus, California's arguments must be accepted and a waiver granted, with respect to technical grounds.

The Option 2 HC and CO standards also involve some judgment because they are based on the Option 1 standards extrapolated out to 100,000 miles using typical deterioration rates. The NOx standard under Option 2 is the same as under Option 1. If a given vehicle exhibits more than typical deterioration, the 100,000-mile standard will be more stringent then the 50,000-mile standards. If a vehicle exhibits less than typical deterioration, the 100,000-mile standards could be less stringent in that a vehicle could exceed the 50,000-mile standards at 50,000 miles and still meet the 100,000-mile standards at 100,000 miles. All this assumes that vehicles certified over 50,000 miles exhibit similar emissions deterioration over the next 50,000 miles. Indeed, this is not the case with many in-use vehicles and much of California's position rests on the difference between certification and in-use emissions.

In their study of this area,4/ California makes it very clear why they believe the Option 2 standards to be more stringent than their own 50,000-mile standards and thus, more stringent then Federal standards. The primary reason is that extending certification and the emissions warranty to 100,000 miles will have a significant effect on reducing the difference between certification and in-use emissions. It is a very simple task to show that gasoline-fueled vehicles do not meet emission standards in-use and it is reasonable to expect 100,000-mile certification to improve this situation. Indeed, the increased level of allowed emissions is not unreasonable for gasoline-fueled vehicles. It would be difficult to argue that the 100,000-mile standards were less stringent than the 50,000-mile standards for these vehicles. Even if a vehicle exhibited low deterioration over 50,000 miles, the extension of testing to 100,000 miles is a significant step, particularly when coupled with the reduced maintenance allowed under Option 2.

The only real difficulty arises with the use of diesels. These vehicles exhibit very low emissions deterioration and the lack of external emission control makes them strong candidates for successfully certifying to 100,000 miles. California acknowledges that these vehicles may be allowed to emit more pollutants under the Option 2 standards than under California's 50,000-mile standards. However, they also point out that in-use emissions from

diesels are much nearer the standards than those from gasoline-fueled vehicles. Thus, even if diesels are allowed to emit slightly more during certification, they will emit far less in-use than the gasoline-fueled vehicles they replace. EPA cannot show this reasoning to be wrong. Thus, California's arguments that the Option 2 standards provide more protection of public health and welfare than their 50,000-mile standards and thus, Federal standards, is reasonable and not arbitrary and capricious.

The argument for the evaporative HC emission allowance is very similar. California is recognizing the connection between exhaust and evaporative HC emissions and allowing some tradeoff between the two. At the same time they avoided a "defacto" relaxation of the two HC standards which would have occurred by directly coupling the two standards.4/ Four restrictions were placed on the allowance. One, the evaporative emission control system had to be especially effective, below 1.0 gram per test, before the allowance became available. Two, the evaporative emission control system must be effective at the above level for at least 50,000 miles. Three, only 75% of the difference between the evaporative emission level and the evaporative HC standard (2.0 grams per test) on a gram per mile basis is given as an exhaust HC emission allowance. Four, the allowance is only available with 100,000-mile certification, which carries with it the 100,000-mile emission warranty, reduced maintenance, etc.

While this allowance is obviously intended to aid diesels, much like the Option 2 standards, it is difficult to discern if it is also realistically intended for gasoline-fueled vehicles. As was the case with the Option 2 standards, a diesel certifying with the allowance could emit more exhaust HC emissions than allowed under Federal standards. The evaporative emissions would be the same in each case, even though the Federal evaporative HC standards would have been allowed more. However, it is quite possible and even likely that these diesels will still emit less HC emissions over their lifetimes than gasoline-fueled vehicles certified to California or Federal 50,000-mile standards, even with the evaporative HC allowance. This is the reasoning that California uses to conclude that the Option 2 standards with the allowance are, in the aggregate, equally protective of public health and welfare as Federal standards. California's position, given the facts, is reasonable and therefore, not arbitrary and capricious.

Conclusions and Recommendations

All technical aspects of California's proposed revisions to their regulations have been examined. The revisions were found to be consistent with Section 202(a) of the Clean Air Act in that they are technologically feasible given available leadtime and cost. California's determination that their standards with these revisions were still at least as protective of public health as

Federal Standards was also found to be reasonable and not arbitrary and capricious. Thus, there appears to be no technical grounds on which EPA should deny a waiver of Federal preemption.

References

1/ Transcript from Public Hearing on California State Motor Vehicle Pollution Control Standards, U.S. EPA, San Francisco, CA., October 24, 1979.

2/ 40 CFR 86.079-25 (a)(1)(i).

3/ 1979 Owner's Manuals of General Motors' vehicles utilizing closed-loop carburetion control.

4/ "Public Hearing to Consider Changes to the Air Resources Board's Standards and Test Procedures for 1980 and Subsequent Model Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles," Staff Report, California Air Resources Board, March 6, 1979.